

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: WONJON PATENT FIRM 8th Floor, Poonglim Bldg., 823-1, Yeoksam-dong, Gangnam-gu, Seoul, 135-784, Republic of Korea
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NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference FF2004PCT026	Date of mailing (day/month/year) 10 DECEMBER 2004 (10.12.2004)
International application No. PCT/KR2004/002127	International filing date (day/month/year) 24 AUGUST 2004 (24.08.2004)
Applicant SAMSUNG ATOFINA CO. LTD. et al	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.


4. Reminders

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

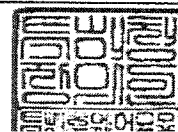
In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/KR
 Korean Intellectual Property Office
 920 Dunsan-dong, Seo-gu, Daejeon 302-701,
 Republic of Korea

Authorized officer

 COMMISSIONER



PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference FF2004PCT026	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">FOR FURTHER ACTION</div> <div>see Form PCT/ISA/220 as well as, where applicable, item 5 below.</div> </div>	
International application No. PCT/KR2004/002127	International filing date (<i>day/month/year</i>) 24 AUGUST 2004 (24.08.2004)	(Earliest) Priority Date (<i>day/month/year</i>) 20 NOVEMBER 2003 (20.11.2003)
Applicant SAMSUNG ATOFINA CO. LTD. et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (See Box No. III)

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. _____

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

international application No.
PCT/KR2004/002127

A. CLASSIFICATION OF SUBJECT MATTER**IPC7 C08F 4/643, C08F 4/614, B01J 31/38, B01J 31/00**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 C08F 4/643, C08F 4/614, B01J 31/38, B01J 31/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and applications for inventions since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
CA-on CD, PAJ, KIPASS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,399,531 B1(UNION CARBIDE CHEM PLASTIC) 04June 2002 see the whole documents	1-4
A	US 6,323,293 B1(Fina Technology, Inc.) 27 November 2001 see the whole documents	1-4
A	US 4,634,746 A (Bradly P.Etherton, Houston; Malcolm J.Kaus, Humble, both of Tex.) 06 January 1987 see the whole documents	1-4
A	JP 11-246620 A (TOHO TITANIUM CO LTD) 14 September 1999 see the whole documents	1-4
A	EP0747401 A1 (FINA TECHNOLOGY) 11 December 1996 see the whole documents	1-4

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

09 DECEMBER 2004 (09.12.2004)

Date of mailing of the international search report

10 DECEMBER 2004 (10.12.2004)

Name and mailing address of the ISA/KR



Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
Republic of Korea

Authorized officer

LEE, Suk Ju



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2004/002127

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US6399531B1	04.06.2002	AU2601501A US6399531B1 W00148038A1	09.07.2001 04.06.2002 05.07.2001
US 6323293B1	27.11.2001	EP860452A1 JP10251330A2	26.08.1998 22.09.1998
US4634746A	06.01.1987	None	
JP 11-246620 A	14.09.1999	US6200921BA W09943718A1 EP978520A1 EP978520A4	13.03.2001 02.09.1999 09.02.2000 18.12.2002
EP0747401A1	11.12.1996	DE69615919D1 DE69615919T2 EP0747401A1 ES2164189T3 JP9104706A	22.11.2001 20.06.2002 11.12.1996 16.02.2002 22.04.1997

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

WONJON PATENT FIRM

8th Floor, Poonglim Bldg., 823-1, Yeoksam-dong, Gangnam-gu, Seoul, 135-784, Republic of Korea

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) **10 DECEMBER 2004 (10.12.2004)**

Applicant's or agent's file reference
FF2004PCT026

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/KR2004/002127

International filing date (day/month/year)

24 AUGUST 2004 (24.08.2004)

Priority date(day/month/year)

20 NOVEMBER 2003 (20.11.2003)

International Patent Classification (IPC) or both national classification and IPC

IPC7 C08F 4/643, C08F 4/614, B01J 31/38, B01J 31/00

Applicant

SAMSUNG ATOFINA CO. LTD. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR



Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

LEE, Suk Ju

Telephone No. 82-42-481-8149



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/002127

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/002127

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-4	YES
	Claims	None	NO
Inventive step (IS)	Claims	1-4	YES
	Claims	None	NO
Industrial applicability (IA)	Claims	1-4	YES
	Claims	None	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 5399531 B1

D2: US 6,323,293 B1

I. Novelty and Inventive step.

The present invention relates to a Ziegler-Natta catalyst for olefin polymerization, which is produced by a method comprising a step of reacting a transition metal compound in which the transition metal has an oxidation number 4 or more with an organomagnesium compound; and a method for polymerization of olefin using said catalyst.

D1 relates to a solid self-supported hybrid catalyst which contains (i) a Ziegler-Natter catalyst component including at least one group IVB metal-containing alkoxide or aryloxy and (ii) Cp, where Cp is a cycloalkadienyl hydrocarbon having 3-30 carbon atoms. D2 relates to a process of polymerization, wherein the catalyst comprises A) a catalyst component consisting essentially of titanium, magnesium, halogen, a polycarboxylic ester, and an organic phosphorus compound, B) an electron donor (organic silicon compound), and C) an organic aluminum compound.

The subject matter of the present invention differs from the disclosure of D1-D2 mainly in that a Ziegler-Natta catalyst for olefin polymerization is produced by a method comprising a step of reacting a transition metal compound having general formula of $MX_{p-(q+r)}(OAr_1)_q(OAr_2)_r$ with an organomagnesium compound, wherein the substituted or unsubstituted aryl group Ar_1 and Ar_2 are not linked to each other.

None of the documents D1-D2 teach or fairly suggest such a Ziegler-Natter catalyst produced by reaction between the transition metal compound and the organomagnesium. In addition, it cannot be considered to a person skilled in the art, with the knowledge of the documents, to use a transition metal compound including the substituted or unsubstituted aryloxy group, an organomagnesium compound and alkyl aluminum as co-catalyst to increase polymerization activity.

Therefore, claims 1-4 of the present invention are considered to meet the requirements of PCT Article 33(2) and 33(3).

II. Industrial Applicability

The subject matter of claims 1-4 is considered to be industrially applicable under PCT Article 33(4).

PATENT COOPERATION TREATY

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NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To:

WONJON PATENT FIRM
8th Floor, Poonglim Bldg.
823-1, Yeoksam-dong
Gangnam-gu
Seoul, 135-784
Republic of Korea

Date of mailing (day/month/year) 11 October 2004 (11.10.2004)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference FF2004PCT026	
International application No. PCT/KR2004/002127	International filing date (day/month/year) 24 August 2004 (24.08.2004)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 20 November 2003 (20.11.2003)
Applicant SAMSUNG ATOFINA CO. LTD. et al	

- By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
- (If applicable) The letters "NR" appearing in the right-hand column denote a **priority document which, on the date of mailing of this Form, had not yet been received by the International Bureau** under Rule 17.1(a) or (b). Where, under Rule 17.1(a), the priority document must be submitted by the applicant to the receiving Office or the International Bureau, but the applicant fails to submit the priority document within the applicable time limit under that Rule, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
- (If applicable) An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a **priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b)** (the priority document was received after the time limit prescribed in Rule 17.1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b)). Even though the priority document was not furnished in compliance with Rule 17.1(a) or (b), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
20 Nove 2003 (20.11.2003)	10-2003-0082478	KR	14 Sept 2004 (14.09.2004)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 338.70.90	Authorized officer Rodolfo CLEMENTE Telephone No. (41-22) 338 8456
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